

REMARKS

Claims 1-12 remain pending in the application. Claims 1 and 10 have been amended.

Reconsideration of the rejections and allowance of the pending application in view of the foregoing amendments and following remarks are respectfully requested.

In the Office Action of January 13, 2005, claim 10 is rejected under 35 U.S.C. § 102(e) as being anticipated by MIYAMOTO, U.S. Patent No. 6,593,965 and claims 1-9, 11 and 12 are rejected under 35 U.S.C. § 103(a) as being unpatentable over MIYAMOTO in view of TSANG et al., U.S. Patent No. 5,900,623 (hereinafter TSANG). These rejections are respectfully traversed.

Independent claim 1 has been amended to more clearly distinguish over the applied prior art references by reciting the thinned pixel data spaced from each other by at least one thinned out pixel data. No new matter is believed to be introduced by the present amendment. In this regard attention is directed to the disclosure, inter alia, related to Fig. 3.

It is an object of the present invention to provide an image reading device by which the interpolation process and the thinning process are carried out in a shorter time.

To achieve the above-noted object, an image reading device of the present invention, as recited in amended claim 1, includes, inter alia, an imaging device that has photo-diodes and color filters provided on the imaging device. The color filter has color filter elements of a plurality of colors, the photo-diodes generate an original image data containing pixel data and each of which corresponds to one of the colors which are arranged in a predetermined distribution. The image reading device further includes a reading processor that reads the pixel data from the imaging device, a thinning processor

that thins out some of the pixel data to generate a thinned image data. The thinned pixel data are uniformly distributed, spaced from each other by at least one thinned out pixel data and colors of the thinned pixel data are arranged in the predetermined distribution. The image reading device further includes an interpolation processor that performs an interpolation process on the thinned image data to generate an interpolated image data for each of the colors.

Applicant respectfully submits that the references relied upon in the rejections under 35 U.S.C. § 103(a), considered singly or in any proper combination, do not disclose such a combination of features. The primary reference MIYAMOTO refers to and is concerned specifically with RGB filter matrices, each of which is made up of four neighboring elements, that are aligned. To generate an image reduced by half in each of horizontal and vertical directions, each group of four neighboring elements is filtered (thinned out) into the half the original number, and the resulting half is then read out. Each of the four groups of pixel data enclosed by lines in Fig. 3 is then stored in the data buffer 3. See, column 3, lines 55-63. Thus, the thinned data are arranged adjacent to each other.

On the contrary, in the present invention, as set forth above, the thinning processor thins out some of the pixel data such that the thinned (i.e., remaining) pixel data are uniformly distributed spaced from each other by at least one thinned out pixel data. According to the description in page 12, line 14- page 13, line 21, the thinned data can be, as a non-limiting example only $R_{m,n}$, $G_{m+3,n}$, $R_{m+6,n}$, $G_{m,n+3}$, $B_{m+3,n+3}$, $G_{m+6,n+3}$, $R_{m,n+6}$, $G_{m+3,n+6}$, $R_{m+6,n+6}$ etc., which are arranged spaced from each other by at least one pixel data, as shown in Fig. 3.

In other words the thinned pixel data is not enclosed by the broken lines P3, and is spaced by the pixel data enclosed by broken lines P3 which encloses therein at least one thinned out pixel data between the thinned pixel data. For example, as shown in Fig 3, the thinned pixel data $R_{m,n}$, and $G_{m+3,n}$ are spaced by the thinned pixels $G_{m+1,n}$, and $R_{m+2,n}$.

MIYAMOTO does not at least disclose this feature in the recited combination. On the contrary, the pixels displayed on a LCD (i.e., thinned pixel data) are arranged to form a group consisting of four adjacent pixels that are not spaced by any pixels, as disclosed in Fig. 3.

Thus, at least for this reason, MIYAMOTO does not render the presently claimed invention unpatentable.

The secondary reference TSANG is directed to active pixel sensors and, particularly to an active pixel sensor design that realizes, in a single chip fabricated using standard CMOS processes, image capturing and various signal processing functions. An application of the sensors would be in a single chip CMOS camera. TSANG also does not teach that the thinned pixel data are uniformly distributed or spaced from each other as recited. Therefore, TSANG does not overcome the deficiencies of MIYAMOTO.

Thus, even assuming, arguendo, that the teachings of MIYAMOTO and TSANG can be properly combined, the asserted combination of MIYAMOTO and TSANG would not result in the invention as recited in amended claim 1.

Independent claim 10 has also been amended to more clearly distinguish over the applied prior art reference by further reciting that the thinned pixel data are spaced from each other by at least one thinned out pixel data.

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Thus, for at least the same reasons set forth above, MIYAMOTO does not anticipate the present invention.


Independent claims 1 and 10 are now in condition for allowance in view of the amendment and the above-noted remarks. Dependent claims 2-9, 11 and 12 are also submitted to be in condition for allowance in view of their dependence from the allowable base claims and also at least based upon their recitations of additional features of the present invention.

It is respectfully requested, therefore, that the rejections under 35 U.S.C. § 103(a) and 35 U.S.C. § 102(e) be withdrawn.

Based on the above, it is respectfully submitted that this application is now in condition for allowance, and a Notice of Allowance is respectfully requested.

Should the Examiner have any questions or comments regarding this response, or the present application, the Examiner is invited to contact the undersigned at the below-listed telephone number.

Respectfully submitted,
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April 13, 2005
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